Shell evolution in the newly-explored neutron-rich region around Z=82 and far beyond N=126: interpretation

A. Gottardo[1,2], J.J. Valiente-Dobon[1], G. Benzoni[3], R. Nicolini[3]
and the Rising Collaboration
[1]*INFN, Laboratori Nazionali di Legnaro, Legnaro (Pd), 35020, Italy*
[2]*University of Padova, Padova, 35131, Italy*
[2]*University of Milan and INFN section of Milan, Milan, 20133, Italy*

Neutron-rich nuclei above ^{208}Pb were populated by using a 1 GeV*A ^{238}U beam at GSI and their study was made possible by the presence of long-lived isomeric states that were indeed expected by shell-model calculations. The resulting fragments were separated and analyzed with the FRS-Rising setup together with a Si array to detect the beta decay [3,4,5].

Several new exotic isotopes have been observed, up to ^{218}Pb along the Z=82 shell closure and up to N=138 and N=135 for the proton-hole and proton-particle Tl and Bi nuclei, respectively. Several isomers were observed for the first time. Their structure involves the neutron $1\nu i_{11/2}$,$1\nu i_{13/2}$ $1\nu j_{15/2}$ and $2\nu g_{9/2}$ shells and proton $1\pi h_{11/2}$ and $1\pi h_{9/2}$ orbitals.

In this presentation we will discuss the results for neutron-rich Z=82 Lead in terms of state-of-the-art shell-model calculations.

The evaluation of the resulting isomers will give clues about the evolution of the nuclear structure into this newly-explored region of the nuclide chart.

[3] H. Geissel et al., Nucl. Instr. Meth. B 70 (1992) 286.
[4] S. Pietri et al., Nucl. Instr. Meth. B 261 (2007) 1079.
[5] R. Kumar et al., Nucl. Instr. Meth. A 598 (2009) 754.